Current and Future Applications of Multispectral (RGB) Satellite Imagery for Weather Analysis and Forecasting Applications

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Current and future satellite sensors provide remotely sensed quantities from a variety of wavelengths ranging from the visible to the passive microwave, from both geostationary and low-Earth orbits. The NASA Short-term Prediction Research and Transition (SPoRT) Center has a long history of providing multispectral imagery from the Moderate Resolution Imaging Spectroradiometer (MODIS) aboard NASA's Terra and Aqua satellites in support of NWS forecast office activities. Products from MODIS have recently been extended to include a broader suite of multispectral imagery similar to those developed by EUMETSAT, based upon the spectral channels available from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) aboard METEOSAT-9. This broader suite includes products that discriminate between air mass types associated with synoptic-scale features, assists in the identification of dust, and improves upon paired channel difference detection of fog and low cloud events.

Future instruments will continue the availability of these products and also expand upon current capabilities. The Advanced Baseline Imager (ABI) on GOES-R will improve the spectral, spatial, and temporal resolution of our current geostationary capabilities, and the recent launch of the Suomi National Polar-Orbiting Partnership (S-NPP) carries instruments such as the Visible Infrared Imager Radiometer Suite (VIIRS), the Cross-track Infrared Sounder (CrIS), and the Advanced Technology Microwave Sounder (ATMS), which have unrivaled spectral and spatial resolution, as precursors to the JPSS era (i.e., the next generation of polar orbiting satellites. New applications from VIIRS extend multispectral composites available from MODIS and SEVIRI while adding new capabilities through incorporation of additional CrIS channels or information from the Near Constant Contrast or "Day-Night Band", which provides moonlit reflectance from clouds and detection of fires or city lights. This presentation will present a review of SPoRT, CIRA, and NRL collaborations regarding multispectral satellite imagery and recent applications within the operational forecasting environment.